UNITED STATES PATENT AND TRADEMARK OFFICE

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EXAMINER
YEN, ERIC L

ART UNIT	PAPER NUMBER
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NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 April 2008*.
2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7 and 9-17* is/are pending in the application.
    4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) *1-7 and 9-17* is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a)☐ All   b)☐ Some * c)☐ None of:
        1.☐ Certified copies of the priority documents have been received.
        2.☐ Certified copies of the priority documents have been received in Application No. _____.
        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.
5)☐ Notice of Informal Patent Application
6)☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1.   In response to the Final Office Action mailed 2/26/08, applicant has submitted an

amendment and Request for Continued Examination filed 4/28/08.

Claims 1-4, 6-7, and 9-14, have been amended. Claim 8 has been cancelled.

New Claims 15-17 have been added.

Response to Arguments

2.   Applicant's arguments with respect to claims 1-7 and 9-14 have been considered

but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

3.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

4.   Claims 1, 6-7, and 9-12, are rejected under 35 U.S.C. 103(a) as being

unpatentable over Junqua (US 6.253,181), in view of Chien ("Quasi-Bayes Linear

Regression for Sequential Learning of Hidden Markov Models")

As per Claim 1, Junqua teaches a method of recognizing a speech signal,

comprising: providing adjustable parameter to a probability density function of a Hidden

Markov Model ("new set of HMMs is constructed… [if only Gaussian mean vectors were

used]", col. 8, lines 1-6; "probability densities", col. 6, lines 28-39)

      detecting a first speech signal ("supplies utterances…performs speech

recognition… passed by the dialogue system to adaptation system", col. 4, lines 24-36)

      using said HMM to recognize said first speech signal ("supplies

utterances…performs speech recognition… passed by the dialogue system to

adaptation system", col. 4, lines 24-36)

      updating said adjustable parameter using said first speech signal ("speech from

new speaker is used to train a speaker dependent model", col. 7, lines 15-31; "further

adapted model", col. 7, lines 42-50; "other HMM parameters", col. 8, lines 1-6;

"Gaussian means", col. 6, lines 15-54)

      recognizing a second speech signal detected after said first speech signal with

said HMM employing said updated adjustable parameter (""adapted speech model", col.

3, lines 12-28; "further adapted model", col. 7, lines 42-50; "supplies

utterances…performs speech recognition… passed by the dialogue system to

adaptation system", col. 4, lines 24-36).

      Junqua fails to teach where the adjustable parameter is an adjustable bias.

      Chien suggests where the adjustable parameter is an adjustable bias ("HMM

pdf… HMM mean vector is transformed… shifting bias vector", Introduction, especially

upper left paragraph of page 269; where the bias vector is taught to be added to the

mean vector to obtain the parameters of a new model, and Junqua similarly teaches

adjusting Gaussian means, and so Chien suggests where Junqua could use a bias vector as one of the parameters being adapted).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Junqua to include the teaching of Chien of where the adjustable parameter is an adjustable bias, in order to provide flexible sequential adaptation, as described by Chien (Introduction, especially lower left paragraph of page 269).

As per Claim 6, Junqua teaches wherein said updating is based on said first speech signal and model parameters of the HMM that are current when said first speech signal is detected ("adapted speech model", col. 3, lines 12-28; "further adapted model", col. 7, lines 42-50; "supplies utterances...performs speech recognition... passed by the dialogue system to adaptation system", col. 4, lines 24-36).

As per Claim 7, Junqua teaches wherein said updating is based on said first speech singla and information derived form all signals detected prior to said first speech signal ("adapted speech model", col. 3, lines 12-28; "further adapted model", col. 7, lines 42-50; "supplies utterances...performs speech recognition... passed by the dialogue system to adaptation system", col. 4, lines 24-36).

As per Claim 9, Junqua suggests wherein a length of said first speech signal is arbitrary ("Answer unintelligible… Yes", col. 4, lines 43-54; where some people take longer than others to articulate words).

As per Claim 10, Junqua suggests wherein said first speech signal is a frame ("sound units", col. 3, lines 12-28; where sound units in speech recognition are known to include phonemes which are also known to have a length that is close to that of a frame, and speech analysis is generally known to be done frame-by-frame).

As per Claim 11, Junqua teaches wherein said first speech signal is an utterance ("Answer unintelligible… Yes", col. 4, lines 43-54; where some people take longer than others to articulate words).

As per Claim 12, Junqua suggests wherein said first speech signal has a fixed length duration ("say… the giraffe is brown", col. 4, lines 43-54; where some people take longer than others to articulate words).

5.   Claims 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Junqua, in view of Chien, as applied to Claim 1, above, and further in view of Lee et al. (US 6,424,960), hereafter Lee.

As per Claim 17, Junqua, in view of Chien, fail to teach wherein said updating includes adding a correction term to said adjustable bias.

Lee suggests wherein said updating includes adding a correction term to said adjustable bias ("speech recognition system", col. 18, lines 4-40; "signals... classifying", col. 1, lines 8-14; "speech", col. 2, line 66 – col. 3, line 4; "mixture model", col. 2, lines 7-36; "adapting the bias vectors", col. 11, lines 11-17where the speech recognition problem is also a classification problem [i.e., classifying input speech and training data into the sound units that are modeled by the HMMs]. Lee, therefore, suggests in a classification model adaptation that bias vectors are parameters that can also be changed, and the changing of bias vector values is done by adding some sort of correction term).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Junqua, in view of Chien, to include the teaching of Lee of wherein said updating includes adding a correction term to said adjustable bias, in order to perform adaptation to selected features of speech or sound, as described by Lee (col. 18, lines 31-33).

6.   Claims 2, 9, and 13-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Junqua, in view of Chien, as applied to Claim 1 and 12, above, and further in view of Tsuboka (US 5,129,002).

As per Claim 15, Junqua, in view of Chien, fail to teach wherein said adjustable bias is state-dependent.

Tsuboka teaches wherein said adjustable bias is state-dependent ("calculates a new estimated value of the parameter in state i", column 14, lines 38-39; Tsuboka teaches generating models from speech, which is applicable to Junqua whose adapted models are generated from input speech).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Junqua, in view of Chien, to include the teaching of Tsuboka of wherein said adjustable bias is state-dependent, in order to generate an HMM in limited conditions, as described by Tsuboka (col. 3, lines 45-54).

As per Claim 16, Junqua teaches wherein said HMM is one of a plurality of Hidden Markov Models for which parameters are updated ("new set of HMMs is constructed... [if only Gaussian mean vectors were used]", col. 8, lines 1-6).

Junqua fails to teach where the parameters are biases.

Chien suggests where the parameters are biases ("HMM pdf... HMM mean vector is transformed... shifting bias vector", Introduction, especially upper left paragraph of page 269; where the bias vector is taught to be added to the mean vector to obtain the parameters of a new model, and Junqua similarly teaches adjusting Gaussian means, and so Chien suggests where Junqua could use a bias vector as one of the parameters being adapted).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Junqua to include the teaching of Chien of where the parameters are biases, in order to provide flexible sequential adaptation, as described by Chien (Introduction, especially lower left paragraph of page 269).

Junqua, in view of Chien, fail to teach wherein said adjustable bias is state-dependent.

Tsuboka teaches wherein said adjustable bias is state-dependent ("calculates a new estimated value of the parameter in state i", column 14, lines 38-39; Tsuboka teaches generating models from speech, which is applicable to Junqua whose adapted models are generated from input speech).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Junqua, in view of Chien, to include the teaching of Tsuboka of wherein said adjustable bias is state-dependent, in order to generate an HMM in limited conditions, as described by Tsuboka (col. 3, lines 45-54).

As per Claim 2, Junqua, in view of Chien, fail to teach wherein said adjustable bias is defined for each state of said HMM.

Tsuboka teaches wherein said adjustable bias is defined for each state of said HMM ("calculates a new estimated value of the parameter in state i", column 14, lines 38-39; Tsuboka teaches generating models from speech, which is applicable to Junqua whose adapted models are generated from input speech).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Junqua, in view of Chien, to include the teaching of Tsuboka of wherein said adjustable bias is defined for each state of said HMM, in order to generate an HMM in limited conditions, as described by Tsuboka (col. 3, lines 45-54).

As per Claim 9, Junqua, in view of Chien, fail to teach wherein a length of said first speech signal is arbitrary.

Tsuboka teaches wherein a length of said first speech signal is arbitrary (column 14, lines 33-34, the length varies from one word to R words).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Junqua, in view of Chien, to include the teaching of Tsuboka of wherein a length of said first speech signal is arbitrary, in order to generate an HMM in limited conditions, as described by Tsuboka (col. 3, lines 45-54).
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As per Claim 13, Junqua, in view of Chien, fail to teach wherein said duration is 10 minutes.

Tsuboka suggests wherein said duration is 10 minutes (see column 14, lines 33-34, the length varies from one word to R words, R being an arbitrary value that represents any length of time, depending on how many words are spoken and how quickly they are spoken).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Junqua, in view of Chien, to include the teaching of Tsuboka

of wherein said duration is 10 minutes, in order to generate an HMM in limited

conditions, as described by Tsuboka (col. 3, lines 45-54).

7.   Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Junqua,

in view of Chien and Lee, as applied to Claim 17, above, and further in view of Tsuboka.

As per Claim 14, Junqua, in view of Chien and Lee, fail to teach wherein said

correction term is a product of a sequence whose limit is zero, whose summation is

infinity and whose square summation is not infinity and the summation of quantities

weighted by a probability, the quantities based on a divergence of desired model

parameter and observed signal.

Tsuboka teaches that said correction term is a product of a sequence whose limit

is zero, whose summation is infinity and whose square summation is not infinity (see

column 13, equations on lines 5-19, the terms are in the form of 1/N) and the

summation of the quantities weighted by a probability, the quantities are based on the

divergence of desired model parameter and observed signal (see column 13, equations

on lines 5-19, $P(wr \mid \lambda)$).

Therefore, it would have been obvious to one of ordinary skill in the art at the

time of invention to modify Junqua, in view of Chien and Lee, to include the teaching of

Tsuboka of wherein said correction term is a product of a sequence whose limit is zero,

whose summation is infinity and whose square summation is not infinity and the

summation of quantities weighted by a probability, the quantities based on a divergence

of desired model parameter and observed signal, in order to generate an HMM in

limited conditions, as described by Tsuboka (col. 3, lines 45-54).

1.   Claims 3, 4, and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Junqua, in view of Chien and Tsuboka, as applied to Claim 15, above, and further

in view of Chien et al. (US 6,662,160), hereafter Chien '160.

As per Claim 3, Junqua, in view of Chien and Tsuboka, fail to teach wherein said

adjustable bias is shared among different states of said HMM.

Chien '160 teaches wherein said adjustable bias is shared among different states

of said HMM ("bias compensation vector b(λ) is shared by all HMM units", column 4,

lines 58-59).

Therefore, it would have been obvious to one of ordinary skill in the art at the

time the invention to modify Junqua, in view of Chien and Tsuboka, to include the

teaching of Chien '160 of wherein said adjustable bias is shared among different states

of said HMM, in order to avoid a "data sparseness problem" (CHIEN, column 4, line 61).

As per Claim 4, Junqua, in view of Chien and Tsuboka, fail to teach wherein said

adjustable bias is shared by groups of states of said HMM.

Chien '160 teaches wherein said adjustable bias is shared by groups of states of said HMM ("bias compensation vector $b(\lambda)$ is shared by all HMM units", column 4, lines 58-59).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention to modify Junqua, in view of Chien and Tsuboka, to include the teaching of Chien '160 of wherein said adjustable bias is shared by groups of states of said HMM, in order to avoid a "data sparseness problem" (CHIEN, column 4, line 61).

As per Claim 5, Junqua, in view of Chien and Tsuboka, fail to teach wherein the adjustable bias is shared by all states of the HMM.

Chien '160 teaches wherein the adjustable bias is shared by all states of the HMM ("bias compensation vector $b(\lambda)$ is shared by all HMM units", column 4, lines 58-59).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention to modify Junqua, in view of Chien and Tsuboka, to include the teaching of Chien '160 of wherein the adjustable bias is shared by all states of the HMM, in order to avoid a "data sparseness problem" (CHIEN, column 4, line 61).

Conclusion

8.   The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See PTO 892.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ERIC YEN whose telephone number is (571)272-4249. The examiner can normally be reached on M-F 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Edouard can be reached on 571-272-7603. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

EY 6/25/08

/Patrick N. Edouard/
Supervisory Patent Examiner, Art Unit 2626